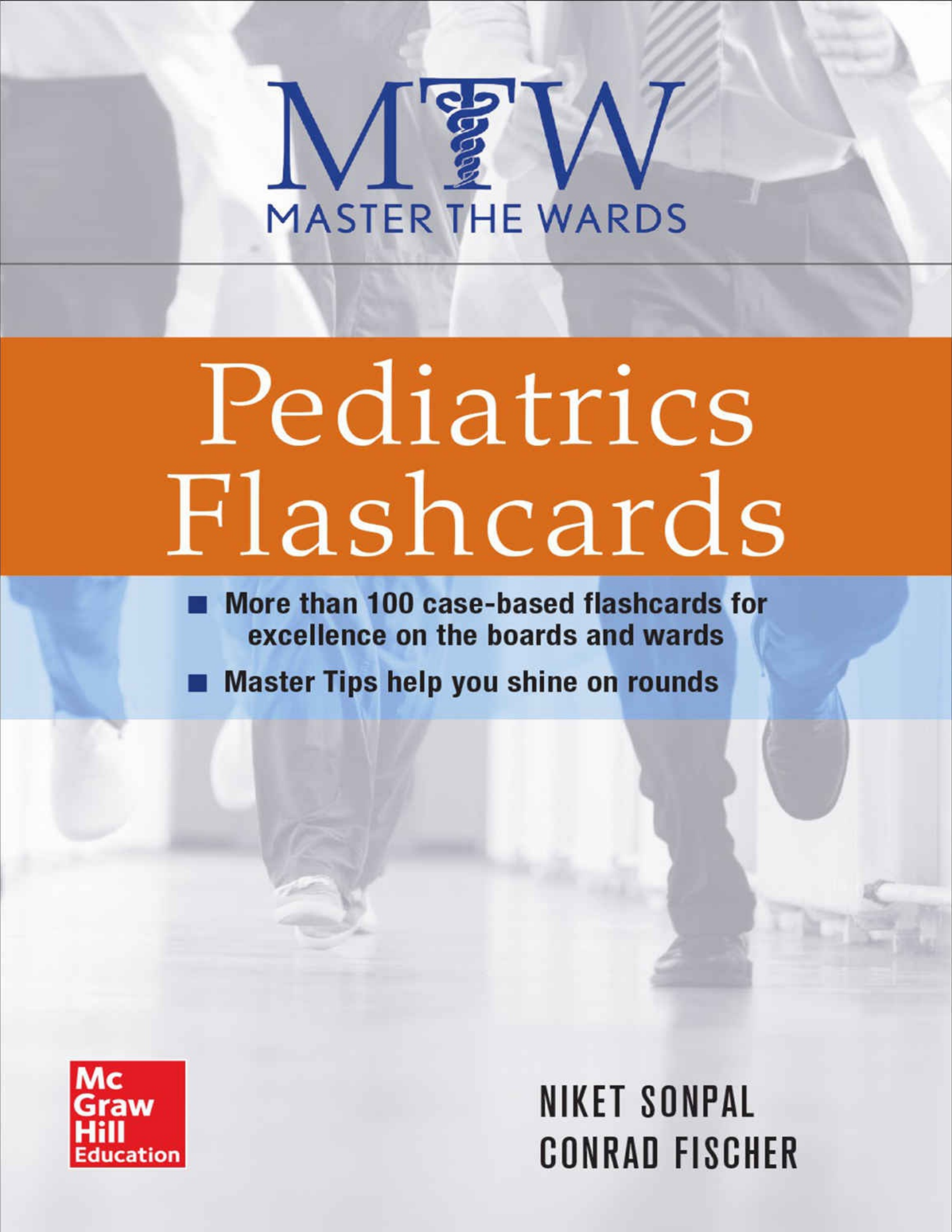

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MASTER THE WARDS

# Master the Wards: Pediatrics Flashcards


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I would like to dedicate this publication to Mr. Mahendra Patel and Mr. Raj Patel of Hope Medical Institute. They have been integral in my success and I would be forever lost without their guidance.

—Dr. Niket Sonpal

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# HOW TO GET THE MOST OUT OF THESE FLASHCARDS

**Master the Wards: Pediatric Flashcards** have been designed to serve "one stop" review of the 100 cases you are most likely to see during your medicine clerkship and be tested on during your shelf exam. Each flashcard provides a common presenting case history (vignette) and clinic-pathologic features, combined with questions commonly asked by your senior physicians and board exams. On the back of each card, you'll find the most up-to-date diagnostic pearls, tests, and therapeutic algorithms for each disease. The deck is color-coded by system so you can carry just what you need and organize your study for maximum results.

—Dr. Niket Sonpal, MD

# ABBREVIATIONS

These are the abbreviations used commonly through these flashcards.

| | |
|---|---|
| ACE | angiotensin-converting enzyme |
| AFP | α-fetoprotein |
| ARB | angiotensin II receptor blocker |
| β-hCG | β-human chorionic gonadotropin |
| BM | bowel movement |
| C3 | complement component 3 |
| CFTR | cystic fibrosis transmembrane conductance regulator |
| CHF | congestive heart failure |
| CMV | cytomegalovirus |
| CSD | cat scratch disease |
| CT | computed tomography |
| DDH | developmental dysplasia of the hip |
| DTaP | diphtheria, tetanus, and pertussis |
| ECG | electrocardiogram |
| ED | emergency department |
| GI | gastrointestinal |
| HBIG | hepatitis B immune globulin |
| HBsAg | hepatitis B surface antigen |
| HBV | hepatitis B virus |
| HHV-6 | virus human herpes virus 6 |
| Hib | *Haemophilus influenzae* type b |
| HIV | human immunodeficiency virus |
| HOCM | hypertrophic obstructive cardiomyopathy |
| HPS | Henoch-Schönlein purpura |
| HPV | human papillomavirus |
| HSV | herpes simplex virus |
| IBD | inflammatory bowel disease |
| IgA | immunoglobulin A |

| | |
|---|---|
| IPV | inactivated polio vaccine |
| IDU | injection drug user |
| IVDA | intravenous drug abuser |
| IV | intravenous |
| LCPD | Legg-Calve-Perthes disease |
| MI | myocardial infarction |
| MMR | measles, mumps, and rubella |
| MRI | magnetic resonance imaging |
| MSM | men who have sex with men |
| NGT | nasogastric tube |
| NSAIDs | nononsteroidal anti-inflammatory drugs |
| NSVD | normal spontaneous vaginal delivery |
| OI | osteogenesis imperfecta |
| ORIF | open reduction internal fixation |
| OSD | Osgood-Schlatter disease |
| PCR | polymerase chain reaction |
| PCV | pneumococcus virus; pneumococcal conjugate vaccine |
| PDA | patent ductus arteriosus |
| $PGE_1$ | prostaglandin $E_1$ |
| PMH | past medical history |
| PPSV | pneumococcal polysaccharide vaccine |
| RFA | radiofrequency ablation |
| RSV | respiratory syncytial virus |
| RV | rotavirus |
| SCFE | slipped capital femoral epiphysis |
| SCID | severe combined immunodeficiency |
| Tdap | tetanus, diphtheria, and pertussis |
| TEE | transesophageal echocardiogram |
| TEF | tracheoesophageal fistula |
| TNF | tumor necrosis factor |
| TTE | transthoracic echocardiogram |
| VSD | ventricular septal defect |
| WPW | Wolff-Parkinson-White |

# NEWBORN MANAGEMENT

The baby was born seconds ago to a 26-year-old G1P0 at 39 weeks' gestation. The mother had no medical problems and no gestational complications. The baby was born via NSVD. The baby is screaming and crying. Vital signs show HR 150 beats/min and RR 30 breaths/min. Physical examination shows the child is awake, crying, and moving all limbs. Passage of meconium is noted, and the skin shows pink centrally but a blue tint peripherally.

- **What is the Apgar score?**
- **What does the Apgar score tell you?**

- **Apgar score:** This baby's score is a 9. Apgar is a measure of how the baby is doing. It is based on the following scoring system: Apgar scores are done at 1 and 5 minutes after birth. The 1-minute score is based on how the baby was doing in utero, and the 5-minute score on how well the baby is responding to the resuscitative treatments or the environment.

- **Evaluation by Apgar:** Apgar score is done at 1 and 5 minutes after birth. The 1-minute score is based on how the baby was doing in utero, and the 5-minute score is based on how well the baby is responding to the resuscitative treatments or the environment.

## MASTER TIP

Range of normal vital signs in newborns:

- Heart rate: 120-160 beats/min
- Respiratory rate: 30-50 breaths/min

A 24-hour-old newborn girl is brought in by her mother. The mother noticed that the baby's eyes are very red, and she is concerned. She states that her delivery was uneventful even though she did not have any prenatal care.

- **What is the most likely diagnosis?**
- **What is the underlying etiology?**
- **What is the best therapy?**

- **Most likely diagnosis:** Chemical conjunctivitis. The most common cause of conjunctivitis in a child aged <24 hours is chemical conjunctivitis caused by eye drops placed by the delivery team to prevent infections. Typically at birth, a newborn baby is given 2 types of antibiotic drops in each eye to prevent infection later on.

- **Etiology:** The most common ointments used include an erythromycin ointment, a tetracycline ointment, or a silver nitrate solution.

- **Best therapy:** The treatment for this form of conjunctivitis is supportive, and the condition is self-limited.

## MASTER TIP

Erythromycin is a bacteriostatic antibiotic that works by binding to the 50s subunit, whereas tetracycline is an antibiotic that works binding to the 30s subunit.

A 4-day-old newborn girl is brought in by her mother. The mother noticed that the baby's eyes are very red, and she is concerned. She states that her delivery was uneventful even though she did not have any prenatal care.

- **What is the most likely diagnosis?**
- **What is the underlying etiology?**

- **Most likely diagnosis:** Gonorrhea. If the newborn presents with red, purulent eyes between days 2 and 7, the most likely agent is *Neisseria gonorrhoeae* as a cause of gonococcal ophthalmia neonatorum.

- **Etiology:** *Neisseria* is gram-negative diplococcus and is the primary reason of prophylaxis, and antibiotics are administered to newborns at birth.

A 15-day-old newborn girl is brought in by her mother. The mother noticed that the baby's eyes are very red, and she is concerned. She states that her delivery was uneventful even though she did not have any prenatal care.

- **What is the most likely diagnosis?**
- **What is the best therapy?**

- **Most likely diagnosis:** Chlamydia. If the child had presented after 7 days, the most likely organism would have been *Chlamydia trachomatis*.

- **Best therapy:** The infection is treated with oral erythromycin. Even though erythromycin is the treatment of choice for chlamydial conjunctivitis, it is not effectively prevented by topical erythromycin at delivery.

A 30-day-old newborn girl is brought in by her mother. The mother noticed that the baby's eyes are very red, and she is concerned. She states that her delivery was uneventful even though she did not have any prenatal care.

- **What is the most likely diagnosis?**
- **What is the best therapy?**

- **Most likely diagnosis:** Herpes. If the child had presented after 7 days, the most likely organism would have been *Chlamydia trachomatis*.

- **Best therapy:** The infection is treated with acyclovir for approximately 10-14 days.

A newborn girl is born and has an Apgar score of 9. The baby was born via normal NSVD. She is screaming and crying. Vital signs are within normal limits. She has had eye drops placed in her eyes.

- **What is the next step in management?**

- **Next step after eye drops:** Vitamin K injection. Newborns are given vitamin K at birth to prevent bleeding caused by vitamin deficiency. Breast milk does not provide adequate amounts. Without vitamin K, the baby may start to bleed intracranially or from the gastrointestinal tract, umbilical cord, nose, or circumcision site.

## MASTER TIP

Vitamin K–dependent bleeding factors are factors II, VII, IX, and X.

A newborn girl is born to a mother who has HIV with a CD4 count of 345 cells/$mm^3$. The baby was born via normal NSVD. The mother wants to know whether she can breast-feed her child.

- **How do you respond?**

- **Response:** There are few absolute contraindications to breast-feeding. Maternal HIV and tuberculosis are the strongest absolute contraindications. Maternal herpes infection of the nipple is also a contraindication.

A newborn girl is born to a mother who has hepatitis C and is on therapy with sofosbuvir and ledipasvir. The baby was born via normal NSVD. The mother wants to know whether she can breast-feed her child. The obstetrics team is also concerned.

- **What is the best response to the mother and obstetrics team regarding breast-feeding in hepatitis C?**

- **Best response:** There is no documented evidence that breast-feeding spreads hepatitis C or B. If the mother's nipples or surrounding areola are cracked and bleeding, she should stop nursing temporarily and switch to the other breast.

A newborn girl is born to a mother who has hepatitis B and is not on therapy. The baby was born via normal NSVD. The mother wants to know whether she can breast-feed her child. The obstetrics team is also concerned.

- **What is the best response to the mother and obstetrics team regarding breast-feeding in hepatitis B?**

- **What is the next best step in management?**

- **Best response:** There is no documented evidence that breast-feeding spreads hepatitis B. If the mother's nipples or surrounding areola are cracked and bleeding, she should stop nursing temporarily and switch to the other breast.

- **Next best step:** The risk of perinatal transmission of HBV to infants born to HBsAg-positive mothers has been reported to be as high as 90% without the use of active and passive immunization. Newborns of mothers who test positive for HBsAg should receive passive-active immunization, with the first dose of the hepatitis B vaccine series and one dose of HBIG administered within 12 hours of delivery at different sites.

A 2-month-old female infant is born via normal NSVD. The mother complains that her breast is hot and painful. On examination her right breast is firm, red, tender, and swollen. No fever is present.

- **What is the most likely diagnosis?**
- **What is the best therapy?**

- **Most likely diagnosis:** Lactational mastitis is an infection of the breast associated with pain, redness, fever, myalgias, and malaise that occurs in the setting of breast-feeding. It is most common during the first 6 weeks postpartum.

- **Best therapy:** Complete emptying of the breast via ongoing breast-feeding, pumping, and/or hand expression; treatment does not require cessation of lactation. Switching to the other breast and, possibly, antibiotics are also options if systemic symptoms such as fever are present.

# VACCINES

A boy was born hours ago to a 29-year-old G3P2 at 38 weeks' gestation. The mother has hepatitis B, and is not on therapy with a viral of 3000 IU/mL. Her liver function tests are all within normal limits.

- **What is the next step in management?**
- **Can this child be breast-fed?**

- **Next step:** Infants should receive hepatitis B immunoglobulin and the first dose of hepatitis B vaccine at birth.

- **Possibility of breast-feeding:** The child can be breast-fed as long as the mother completes the course of vaccination.

## MASTER TIP

The first dose of hepatitis B vaccine in children of noninfected mothers is administered at birth.

An 8-week-old female infant was born to a 25-year-old G1P0 at 36 weeks' gestation, and is here for her first well-child visit. The mother is concerned about vaccination because she read on social media that they can be harmful. After you explain that vaccines must be given as they save lives, she is curious about what vaccines her child should receive.

- **What vaccines should this child receive?**

- **Vaccines:** The child at 2 months of age should receive the following:

1. RV: RV vaccine protects against rotavirus.
2. DTaP: DTaP vaccine protects against diphtheria, tetanus, and pertussis (whooping cough).
3. Hib: Hib protects against *Haemophilus influenzae* type b.
4. PCV: PCV vaccine protects against pneumococcus.
5. IPV: IPV protects against polio.

## MASTER TIP

Birth = Be
Hep **B**

2, 4, 6 months = DR HIP
**D**TaP, **R**V, **H**ib, **I**PV, **P**CV

12 months = **HH**ave 2 **V**ery **M**any
**P**atients. **H**ib, **H**epA, **V**ZV, **M**MR,
**P**CV

4-6 years: h**IM** **D**id **V**erify
**I**PV, **M**MR, **D**TaP, **V**ZV,

Teen Vaccines: **H**old **M**any **T**eens.
**H**PV, **M**CV, **T**dap

A 14-month-old is brought in by her Indian mother who wants to take her child to India, and wants to know whether her child should be vaccinated to anything special. She is up to date on her other vaccinations.

- **What vaccines should this child receive?**

- **Vaccines:** Travel to India requires that the child be vaccinated to hepatitis A, which is a 2-dose vaccination. The child should complete both vaccinations prior to travel. Hepatitis A spreads via fecal-oral means, and thus the child is at risk with contaminated water in India and other endemic regions.

A 9-year-old child with Crohn disease treated with infliximab is brought in by his mother for a well-child visit. He is a clinical remission and receives an infusion every 8 weeks. His school nurse wants verification of vaccinations.

- **What are contraindications to getting a vaccine?**

- **Contraindications:** Vaccinations should always be given to children except under 2 important circumstances: First, if there is a moderate to severe acute illness occurring. Second, if the child is immunocompromised and no live virus vaccinations, such as MMR or varicella, are administered.

## MASTER TIP

The child is not immunocompetent if he is given TNF inhibitors such as infliximab.

A 9-year-old boy is brought in by his mother for an annual well-child visit. When offered an influenza vaccine, the mother denies it, as her child is allergic to egg protein.

- **How do you respond to this parent?**

- **Response to parent:** Recent studies have shown that even individuals with confirmed egg allergy can safely receive the flu vaccine.

## MASTER TIP

Two doses of flu vaccine are recommended for children aged 6 months through 8 years who are receiving this vaccine for the first time.

A 14-year-old adolescent girl is brought in by her mother for well-child visit, and the mother wants to know whether her daughter needs any vaccinations for HPV?

- **What should you recommend to this patient?**

- **Recommendation to patient:** HPV is a sexually transmitted pathogen that causes anogenital disease in males and females. Gardasil, a quadrivalent HPV vaccine, targets HPV types 6, 11, 16, and 18, and is recommended to girls aged 11-12 years, but it can be administered as early as 9 years. Catch-up vaccination should be offered for females aged 13-26 years who have not been previously vaccinated.

A 17-year-old adolescent boy comes to clinic with his father for a school physical. His father does not come into the examination room. The patient has no complaints, and states that he is sexually active with other males and that he wishes to have the HPV vaccination.

- **What should you recommend to this patient?**

- **Recommendation to patient:** HPV is a sexually transmitted pathogen that causes anogenital disease in males and females. Gardasil, a quadrivalent HPV vaccine, targets HPV types 6, 11, 16, and 18. Routine immunization should be offered to boys aged 11-12 years, but it can be administered as early as 9 years. Catch-up vaccination should be offered to males aged 13-21 who have not been previously vaccinated. For MSM contact, catch-up vaccination should be offered up

  to age 26.

An 18 months old child with known congenital lack of hearing is being evaluated for cochlear implant and is here for his preoperative assessment.

- **What should you recommend to this patient?**

- **Recommendation to patient:** The increased incidence of bacterial meningitis, particularly pneumococcal meningitis, in patients with cochlear implants has led to the need for vaccination against pneumococcus. All children should receive all doses of the pneumococcal conjugate and Hib vaccines. This patient should receive the pneumococcal conjugate vaccine (PCV13) series followed by a single dose of the pneumococcal polysaccharide vaccine (PPSV23) prior to surgery.

A 17-year-old adolescent boy is going to start college in 1 year and his mother wants him to get vaccinated so “he doesn’t get anything in those fraternity houses.” The patient is otherwise healthy, doing well in school, and is on the varsity basketball team.

- **What should you recommend to this patient?**

- **Recommendation to patient:** Meningococcal meningitis, caused by Neisseria meningitidis, can be prevented, and thus this patient should get the vaccine prior to leaving for college. Outbreaks of meningococcal infection on college campuses have attracted considerable attention, and therefore military barracks, or college dorms, are considered high risk.

An 18-month-old child with a PMH of intussusception comes in for follow-up examination. She underwent small bowel resection at 6 months of age due to intussusception and has been doing well since. The mother states that she is feeding well, playful, and is up to date on all vaccines except rotavirus.

- **What should you recommend to this patient?**

- **Recommendation to patient:** Rotavirus vaccines are contraindicated in infants with a history of intussusception. It has been reported after the second dose and thus should be avoided in these patients.

## MASTER TIP

Rotavirus vaccines are contraindicated in infants with

- Latex allergy
- Anaphylactic allergic reaction after a previous dose
- SCID

# GENETICS

A 1-year-old boy is brought to the office because his mother states that he is not meeting developmental milestones. The mother states that the patient did not start to sit alone until 10 or 11 months of age and still is not walking. The patient is not even crawling yet. On examination there are upslanting palpebral fissures, epicanthal folds, midface hypoplasia, and a holosystolic murmur.

- **What is the most likely diagnosis?**
- **Is there a screening test?**

- **Most likely diagnosis:** The most likely diagnosis is Down syndrome that is due to a trisomy 21. The extra chromosome 21 may also occur due to a robertsonian translocation in 2%-4% cases.

- **Screening test:** The triple screen measures serum levels of AFP (low), estriol (low), and β-hCG (high).

A 16-month-old boy is brought to the office because his mother states that he is not meeting developmental milestones. On examination, the child has rocker bottom feet with overlapping fingers. He was diagnosed with pneumonia last month and is not in respiratory distress at this time.

- **What is the most likely diagnosis?**

- **Most likely diagnosis:** Edwards syndrome that is also known as trisomy 18. Edwards syndrome is a chromosomal abnormality characterized by the presence of an extra copy of genetic material on the 18th chromosome, either in whole or due to translocations.

A newborn boy who is 12 hours old is brought to the office. On examination, the child has a cleft lip and palate, and polydactyly.

- **What is the most likely diagnosis?**
- **Is this condition compatible with life?**

- **Most likely diagnosis:** Patau syndrome that is also known as trisomy 13. Patau syndrome is a chromosomal abnormality characterized by the presence of an extra copy of genetic material on the 13th chromosome and is a board favorite as the child will have polydactyly.

- **Compatibility with life:** The condition is usually incompatible with life, and palliative care should be offered to the patient.

A 12-month-old girl is brought in by her mother because she is not as playful as she used to be. The child on her last 6 month examination was well, and no active problems were noticed. She has since stopped being playful, and does not walk or cruise as often. On examination you noticed that she is wringing and squeezing her hands over and over.

- **What is the most likely diagnosis?**

- **Most likely diagnosis:** Rett syndrome. Characterized by initially normal development, and then loss of speech, purposeful hand use, onset of stereotypic hand movement, and gait abnormalities are experienced. Additional features can include deceleration of head growth, seizures, autistic features, and intermittent breathing abnormalities.

An obese 5-year-old child is brought in for his doctor's appointment. The child is refuge from a war-torn country and has never seen a doctor before. The parents say he is a happy boy and eats very well. On examination he has almond-shaped eyes, a small, down-turned mouth, and very small hands and feet. The boy has bilateral undescended testicles and, on gait testing, has unstable hip movement with both passive and active movements. During the examination the child is eating chips, and when you try to move the bag away, he screams and becomes aggressive toward you.

- **What is the most likely diagnosis?**
- **What is the best initial test?**
- **What is the most accurate test?**
- **What is the best treatment?**

- **Most likely diagnosis:** Prader-Willi syndrome, a congenital disease caused by gene missing from part of chromosome 15.
- **Best initial test:** Physical examination helps identify the patients.
- **Most accurate test:** Genetic testing.
- **Best treatment:** The best treatment is aimed at supportive care including behavioral, hormonal, and cognitive therapy. With appropriate behavioral therapy and education, children can be high-functioning.

## MASTER TIP

Deletion of the same region on the maternal chromosome 15 causes Angelman syndrome.

A 7-year-old boy is brought to his pediatrician. He shows signs of developmental delay and has trouble in school. On examination he avoids eye contact, has a prominent jaw, large soft ears, pectus excavatum, and large testicles.

- **What is the most likely diagnosis?**
- **What is the most accurate test?**
- **What is the treatment?**

- **Most likely diagnosis:** Fragile X syndrome is an X-linked genetic abnormality characterized by a trinucleotide and is due to a defect in methylation and expression of the *FMR1* gene. It is the second most common cause of mental retardation and the most common cause of mental retardation in boys. Most notable physical findings include a prominent jaw, large soft ears, pectus excavatum, and large testicles. There is a wide range on the level of mental disability/retardation.

- **Most accurate test:** Genetic studies.

- **Treatment:** Treatment is supportive and there is no cure.

A baby girl is brought in for well-child visit. On examination you notice that she smiles when played with, turns her head to sounds, and, while on her stomach, is able to hold her head up. When held by her mother, she tries to look at her parents but is very sleepy.

- **What is the age of this child?**

- **Age of child:** The approximate age of this child based on her developmental, social, language, cognitive, and physical milestones is about 2 months. On your rotations, understanding the developmental milestones is very high yield, as well as for the board exam.

A baby boy is brought in for well-child visit. On examination you notice he is able to sit upright without support, he babbles when you play with him, and when you try to take him away from his mother, he screams bloody murder.

- **What is the age of this child?**

- **Age of child:** The approximate age of this child based on her developmental, social, language, cognitive, and physical milestones is about 6 months, which most notably is characterized by stranger anxiety and the ability to sit upright.

A baby girl is brought in for well-child visit. On examination you notice he responds to her name, and tries to put your stethoscope bell in her mouth. She moves her little toy from her left to right hand without any help, and can say “mama” and “dada.” When the baby leaves, she waves “bye bye” to you.

- **What is the age of this child?**

- **Age of child:** The approximate age of this child based on her developmental, social, language, cognitive, and physical milestones is about 9 months, which most notably is characterized by nonspecific words such as “mama” and “dada,” and the ability to respond to their names.

A baby girl is brought in for well-child visit. On examination you notice she points to things she wants from her caregiver during the examination, stands alone, is able to cruise with the help of someone, and can even take a few steps independently. When asked whether she wants a snack, she shakes her head no and laughs. On getting dressed she puts her arm or leg out to aid in dressing.

- **What is the age of this child?**

- **Age of child:** The approximate age of this child based on her developmental, social, language, cognitive, and physical milestones is about 1 year. It is most notably characterized by the ability to start walking and cruising. The child will also display playfulness and will even make simple decisions about things they may want.

A 6-year-old boy is brought by his mother for frequent nighttime bed wetting. The mother states that he slept through the night without wetting his bed for the last 2 years. However, for the last several weeks, he has been wetting the bed every night. The mother states that they have recently moved to a new home. The patient is continent during the day.

- **What is the most likely diagnosis?**
- **What is the next best step in management?**
- **What is the best initial therapy?**
- **What is the most effective therapy?**

- **Most likely diagnosis:** Secondary enuresis is followed by a period of at least 6 months of dryness. Secondary enuresis is often manifested when the child becomes distressed, such as with the birth of a new sibling or having to change their environment. Primary enuresis is most common and it means that a child has never had a dry period. It usually occurs in much younger children.

- **Next best step:** A urinalysis is always the first step in assessing enuresis. Enuresis may be the first sign of a urinary tract infection.

- **Best initial therapy:** The most effective way to help the child is to set a nighttime alarm to help the child use the bathroom and not wet the bed. This in conjunction with supportive care to become less distressed by recent changes and treating the underlying behavioral issue are the best steps.

- **Most effective therapy:** Desmopressin is the most accurate therapy for nocturnal enuresis when decreased fluid intake before bed and nighttime alarms have failed.

A 5-year-old boy is brought to the office by his mother for fecal incontinence. The mother states that the boy is very embarrassed but soils himself more than 3 times a week. On examination, rectal tone is normal, and there are no signs of abuse. The child is otherwise happy and is engaging with you

during the examination.

- **What is the most likely diagnosis?**
- **What is the most common cause?**
- **What is the best therapy?**

- **Most likely diagnosis:** Encopresis affects about 1%-2% of kids aged <10 and can be very troubling for parents as well as the child. The stool (or BM) is hard, dry, and difficult to pass when a person is constipated. Patients attempt to "hold" their BMs to avoid the pain they feel when they go to the bathroom, which sets the stage for having an accident.

- **Most common cause:** Most encopresis cases (90%) are due to functional constipation.

- **Best therapy:** A change in diet and exercise to increase dietary fiber and hydration. This in conjunction with stool softeners initially and timed bathroom schedule will help the child get back on track, and over time the need for stool softeners will diminish.

A 28-month-old boy presents to the office with his mother for concerns about his speech. The mother states that the patient seems to have forgotten how to speak and refuses to pay attention to her. The patient is walking alone, trying to climb the stairs, and likes to scribble on paper. He likes to organize his blocks by colors and is varying heights. He avoids looking anyone in the eye, and refuses to interact with his mother or you as the physician.

- **What is the next best step in management?**
- **What else should be considered in the differential?**
- **What is the best therapy?**

- **Next best step:** Any time there is a concern about the patient's language development, a hearing test should be done.

- **Consideration in the differential:** The patient is experiencing some red flags for autism, including language delay and social interaction issues. Any patient who is thought to possibly have autism should be sent directly for early intervention or in case of neurodevelopmental disorder for evaluations.

- **Best therapy:** For autism the best therapy is based on the degree of impairment and where the child falls on the spectrum.

# PULMONARY

A 9-month-old infant with no medical history presents to the office for shortness of breath and a cough. The mother states that since the winter started, the child has been coughing more frequently. The patient attends daycare. On examination, there are intercostal retractions and wheezing diffusely.

- **What is the next best step in management?**
- **What is the most likely diagnosis?**
- **What is the most common cause?**
- **What is the most effective therapy?**
- **How to prevent this from occurring?**

- **Next best step:** Obtain pulse oximetry, usually on a finger or toe, and start to administer albuterol. Transfer of the patient to ED should also be considered if she does not feel better.

- **Most likely diagnosis:** Bronchiolitis is inflammation of the smallest airways. It is the most common form of respiratory problems in children aged 3-6 months, but it may occur up until 2 years of age.

- **Most common cause:** RSV.

- **Most effective therapy:** Inhaled short- and long-acting β-agonists.

- **Prevention:** Frequent hand washing is one effective way to cut down on the occurrence of RSV.

A 4-year-old boy is brought to the ED by his mother for cough and shortness of breath. He has been coughing, wheezing, and short of breath for 2 days. The mother states that he has also had a fever of 101.2°F and a runny nose. Pulse oximetry is 81% on room air, and there are nasal congestion, bilateral wheezing, and intercostal retractions, and the child is unable to complete full sentences.

- **What is the next best step in management?**
- **What is the most likely diagnosis?**
- **What is the most common cause?**
- **What is the most effective therapy if the initial treatment does not work?**

- **Next best step:** Administration of albuterol. Opening up the bronchioles will allow the patient to breathe more oxygen and lead to decreased distress. If the patient does not improve, intubation should be considered.

- **Most likely diagnosis:** This patient is wheezing and is in respiratory distress likely due to an asthma attack.

- **Most common cause:** Asthma exacerbations are often precipitated by viral infections, as seen by the runny nose and fever.

- **Most effective therapy:** Methylprednisolone is a glucocorticoid to reduce airway inflammation, and it should be given if the patient does not improve after several rounds of albuterol.

A 15-year-old adolescent girl is brought to the office by her mother. The patient states he has difficulty breathing and coughs after exercising with her gymnastics team. She has not been given any medications previously. She states that she sometimes has to stop playing at school because of the cough and difficulty breathing. On examination, the patient feels well and her lungs are clear to auscultation.

- **What is the most likely diagnosis?**
- **What is the next best step in management?**
- **What is the best long-term treatment?**

- **Most likely diagnosis:** Exercise-induced asthma that is a narrowing of the airways in the lungs that is triggered by strenuous exercise. It causes shortness of breath, wheezing, coughing, and other symptoms during or after exercise.

- **Next best step:** β-Agonist to be used before exercise.

- **Best long-term treatment:** Asthma medicines that are taken every day to prevent symptoms and attacks such as long-acting β-agonists and inhaled steroids.

A 12-year-old adolescent girl with no past medical history presents to the office with her mother for 2 days of cough and fever. The mother states that the child has been coughing up yellow to green looking sputum. She also has a runny nose and a temperature of 101.1°F. The child had a choking spell 2 days ago when attempting to eat her food. Lung examination shows crackles in the right lower lung field and dullness to perfusion in the right lower lung.

- **What is the most likely diagnosis?**
- **What is the next best step in management?**

- **Most likely diagnosis:** Aspiration pneumonia in which oral contents are inhaled most commonly into the right lower lung and can yield fevers and a fluid collection. Two other forms of infections

  can be in a normal healthy child called *community-acquired pneumonia*, while a child who was recently hospitalized can develop hospital-acquired pneumonia.

- **Next best step:** The patient should receive antibiotics; clindamycin is used in aspiration pneumonia. Azithromycin and the macrolides are the initial drugs of choice in children aged >5 years with community-acquired pneumonia. However, if the child is unable to tolerate medications or is clinically unstable, she should be admitted.

## MASTER TIP

The most common bacterial cause of community-acquired pneumonia is streptococcal pneumonia.

A 1-year-old child presents to the ED for an episode of choking and coughing after putting a lego in her mouth. The mother states that she turned her back to answer the phone for a second when the child started to cough and gasp for air. On examination, there are decreased breath sounds to the right side.

- **What is the most likely diagnosis?**

- **What is the next best step in management?**

- **Most likely diagnosis:** This child has clearly aspirated a foreign body and is coughing and choking because of it. It is not obstructing the airway, but in other situations it can and yield more serious outcomes.

- **Next best step:** Bronchoscopy is both diagnostic and therapeutic for patients with foreign-body aspiration.

A 1-day-old neonate, born at 41 weeks' gestation to a G1P0 white mother with a routine prenatal history, has not passed a stool yet. The patient's abdomen seems to be distended, and he vomited once. The vomit was green. Abdominal x-ray shows multiple air fluid levels consistent with small bowel obstruction.

- **What is the most likely diagnosis?**
- **What is the next best step in management?**
- **What is the most accurate test?**
- **What is the best therapy?**

- **Most likely diagnosis:** Meconium ileus presents in a newborn when the first stool (meconium) fails to pass and causes an obstruction in the intestines. This presents with abdominal distension, vomiting bilious materials, and failure of stool to pass. The abdominal radiography of meconium ileus shows an obstruction in the small intestines.
- **Next best step:** Sweat chloride testing.
- **Most accurate test:** Gene testing for mutations in the CFTR gene is done if the sweat chloride test result is positive.
- **Best therapy:** Ivacaftor is an oral drug that has been approved for use in children aged ≥6 years with the G551D mutation. This medication restores the function of the CFTR gene and treats the underlying symptoms and issues. However, in this child supportive care until he grows older is the plan of choice.

A 3-year-old child is brought to the ED for a persistent cough. The mother states that her child has a cough that scares their dog because it sounds like barking. Chest radiography shows a narrowing of the upper airway without foreign body.

- **What is the most likely diagnosis?**
- **What is the most accurate test?**
- **What is the best therapy?**

- **Most likely diagnosis:** Croup is a viral infection of the upper airway that causes white blood cell infiltration and swelling of the upper neck. The cough is characterized by inspiratory stridor and a barking cough.

- **Most accurate test:** PCR for virus, but it is not needed clinically.

- **Best therapy:** Single-dose dexamethasone. Intubation and nebulized epinephrine are the appropriate therapy if the child has severe disease characterized by cyanosis and is diagnosed with both inspiratory and expiratory stridor with progressing to stridor at rest.

## MASTER TIP

If gray membranes are seen in the posterior pharynx, *Corynebacterium diphtheriae* is likely the most common cause.

A 9-year-old boy presents with a sudden onset of an extremely sore throat and high fevers, and is drooling and cannot tolerate his secretions. The mother does not believe in vaccinations. Examination reveals a hot potato voice, and stridor heard on passing breathing. He is febrile and cannot answer any other questions.

- **What is the most likely diagnosis?**
- **What is seen on x-ray?**
- **What is the next best step?**
- **What is the most urgent issue?**

- **Most likely diagnosis:** Epiglottitis is an inflammatory process of the epiglottitis caused by the bacterium *Haemophilus influenzae* type b. The epiglottis becomes swollen, and subsequently causes fever, difficulty in swallowing, and drooling.

- **X-ray finding:** The most common finding on a patient with epiglottitis is a thumbprint sign.

- **Next best step:** Radiography for diagnosing epiglottitis, but the most accurate test is direct visualization of the epiglottis using nasopharyngoscopy or laryngoscopy, neither of which should occur without securing an airway.

- **Most urgent issue:** In a patient with epiglottitis, the most urgent issue is airway management because the slightest irritation or manipulation of the epiglottis could result in complete airway closure; therefore, intubation in a monitored setting is the best next step in management. Ceftriaxone should be started concurrently.

## MASTER TIP

Rifampin must be given to all close contacts.

A 10-year-old boy is brought to the ED for coughing. His mother says that he has a cough that will not go away and that has lasted 15 days or longer. In the ED, the child is coughing repeatedly, and after several episodes of coughing, he gasps loudly for air.

- **What is the most likely diagnosis?**
- **What is the best diagnostic test?**
- **What is the next best step?**

- **Most likely diagnosis:** *Bordetella pertussis* is an infection of the upper respiratory tract in which there are 3 phases; it is characterized by fits of coughing followed by gasping for air, which sounds like a large whoop. The most common risk factor is the patient's being unvaccinated to DTaP.

- **Best diagnostic test:** PCR assay for *B. pertussis*.

- **Next best step:** An acute coughing illness that lasts at least 14 days in a person with at least 1

  characteristic pertussis symptom such as a whooping cough should be treated with azithromycin and supportive care. A PCR assay should be performed, but waiting for a result should not delay treatment.

# ENT

A 4-year-old boy is brought to the office because he is tugging at his left ear. The mother states that for the past 4 days, the patient has been eating less, more irritable, and tugging on his left ear.

- **What is the most likely diagnosis?**
- **What is the best therapy?**
- **What if this was the fifth episode of otitis media for this child in 1 year?**

- **Most likely diagnosis:** Acute otitis media that is an infection of the middle ear commonly seen in the pediatric population.

- **Best therapy:** Amoxicillin is the treatment of choice for acute otitis media. Amoxicillin–clavulanate is the first-line treatment if the patient was on antibiotics recently or was at increased risk of β-lactam resistance. Azithromycin is used if the patient had an anaphylactic reaction when penicillin was taken.

- **>5 episodes of otitis media:** If patients have >3 episodes of acute otitis media in 6 months or ≥4 episodes in 1 year, it is an indication for tympanostomy tubes. Prophylactic antibiotics or ear drops are not recommended.

An 8-year-old girl's left ear has been hurting for 2 days. She states that it is dull and achy pain. The mother states that the patient has been irritable and had a low-grade temperature. The patient states that she woke up this morning with yellow stains on her pillowcase. Her left ear is slightly edematous, and there is canal swelling. She experiences pain on movement of the pinna. Cerumen is, however, present.

- **What is the most likely diagnosis?**
- **What is the best therapy?**

- **Most likely diagnosis:** Otitis externa is an infection of the outer ear canal that runs from the eardrum to the outside of the head, and the most common cause is *Pseudomonas*.

- **Best therapy:** Ciprofloxacin–dexamethasone ear drops are the treatment of choice.

A 5-year-old child who attends daycare is brought in by her mother for painful swallowing. Examination shows a fever 101°F and red and swollen tonsils, with white patches and streaks of pus. Swollen lymph nodes in the front of the neck are also palpated.

- **What is the most likely diagnosis?**
- **What is the best therapy?**

- **Most likely diagnosis:** Bacterial pharyngitis, which is inflammation of structures of the pharynx due to group A β-hemolytic strep. It is diagnosed clinically, but a rapid DNAase antigen detection test can correlate findings.

- **Best therapy:** Amoxicillin is the first-line treatment in patients with strep throat. If the patient is allergic to penicillin, macrolides or cephalosporins are the first-line treatment.

## MASTER TIP

The modified Centor criteria are a set of 5 criteria; the total score indicates the probability of a streptococcal infection. One point is given for each of the criteria, where 1 point means no antibiotics and scores of 4-5 mean empiric therapy.

1. Absence of a cough
2. Swollen and tender cervical lymph nodes
3. Temperature >38.0°C (100.4°F)
4. Tonsillar exudate or swelling
5. Age <15 (a point is subtracted if age >44)

A 14-year-old adolescent boy presents 3 weeks after having had a nonproductive cough and congestion that lasted about 10 days. He states he feels fine now, but his mother wants to ensure that he is not going to get sick again. He did not have a fever, and got better with fluids and rest.

- **What is the most likely diagnosis?**

- **Most likely diagnosis:** Bronchitis, which is most likely due to viral infections in the winter months. The diagnosis is made clinically and the treatment is mainly supportive. However, many patients can develop a superimposed bacterial infection that will require antibiotics.

A 4-year-old boy is brought to the office with his mother for ear pain and headache. His right ear appeared red and was sticking out farther than the other ear. The patient has been pulling on the right ear, has been irritable, and does not play with his sister.

- **What is the most likely diagnosis?**
- **What is the next best step?**
- **What is the best therapy?**

- **Most likely diagnosis:** This patient may have malignant otitis external. This is an infection and complication of otitis externa, when the infection moves into the mastoid process and can cause cranial osteomyelitis.

- **Next best step:** For this patient, CT of the head is required to begin treatment. Antibiotics should not be started without a diagnosis. Although biopsy is the most accurate test, it should not be done until after a CT or MRI of the mastoid air cells.

- **Best therapy:** Ceftazidime is an antipseudomonal drug that is often used in children with malignant otitis externa. First-line treatment in patients aged >18 years is ciprofloxacin.

A 9-year-old boy was brought to the office for trouble swallowing for 2 days. He states he has been having severe pain on the right tonsil with right ear pain for 2 days. The patient has also had decreased oral intake. Examination shows enlarged right-side tonsil with deviation of the uvula to the left side.

- **What is the most likely diagnosis?**
- **What is the next best step?**
- **What is the best therapy?**

- **Most likely diagnosis:** Pharyngeal abscess is the most common deep infection in the neck, characterized by unilateral sore throat, muffled voice, drooling, and neck and ear pain on the affected side.

- **Next best step:** As long as the child is stable, CT of the neck can distinguish between an abscess and cellulitis.

- **Best therapy:** Incision and drainage of the abscess. The fluid should be collected and sent for culture. While waiting for culture results, ampicillin–sulbactam should be administered.

A 1-month-old male infant is brought to the office for his 1-month visit. The patient is being breast-fed by his mother, gaining weight, opening his eyes more, and smiling. The mother has no concerns but states someone saw a picture of her on Facebook and noticed that the right eye looked weird with the flash. White reflex is present in the right eye, red reflex is present in the left eye.

- **What is the most likely diagnosis?**
- **What is the next best step?**

- **Most likely diagnosis:** The child has a white reflex on eye examination, indicating that the child has retinoblastoma. Retinoblastoma is the most common intraocular malignancy of childhood, and the child could lose his vision and, possibly, his life if left untreated.

- **Next best step:** The next step in management is prompt referral to an ophthalmologist.

# ORTHO

A 1-week-old newborn is brought to the office for well-child visit. The child was born preterm at 31 weeks' gestation in the breech condition. The patient's older brother was born with "hip problems" as per the mother. Physical examination shows that a palpable "clunk" is present when the hip is directed in and out of the acetabulum.

- **What is the most likely diagnosis?**
- **What is the best test?**
- **What is the best therapy?**

- **Most likely diagnosis:** Developmental dysplasia of the hip (DDH) presents in preterm children, more commonly in girls with breeching positioning in utero, with a family history and pathognomonic tests on physical examination. The two findings are known as the *Barlow* and *Ortolani* tests.

- **Best test:** Ultrasonography of both the hips. Radiography is the best test in a patient after 4 months of age.

- **Best therapy:** A Pavlik harness.

A 10-year-old boy is brought to the office for limping and pain. The child has had trouble walking for 4 months. The pain is located to the front of his thigh. He says when he does not play outside, he rests and feels better. The parents say he did not have a fall, trauma, or sports-related accident.

- **What is the most likely diagnosis?**
- **What is the best test?**
- **What is the best therapy?**

- **Most likely diagnosis:** Legg-Calve-Perthes disease (LCPD) is characterized by a painless limp in boys aged 4-10 years. The etiology of the problem is related to osteonecrosis of the proximal femoral epiphysis and is thought to result from vascular compromise.

- **Best test:** Radiography of the hip is the next best step management and the best diagnostic test for LCPD. Narrowing of the femoral head with compression and deformity of the femoral neck may occur as a result of vascular insufficiency.

- **Best therapy:** The therapies to increase mobility include casting, rest, and physical therapy. If the patient does not improve, surgery is indicated.

A 15-year-old adolescent boy presents with left hip pain and knee pain. The child is obese and has been battling weight loss for 4 years. He has recently developed glucose intolerance because of his weight and wishes to begin an exercise regimen.

- **What is the most likely diagnosis?**
- **What is the best test?**
- **What is the best therapy?**

- **Most likely diagnosis:** Slipped capital femoral epiphysis (SCFE) is the most likely diagnosis in adolescent boys who present with hip and knee pain in the setting of obesity. SCFE represents a unique type of instability of the proximal femoral growth plate from stress caused by shear forces from obesity.

- **Best test:** The diagnosis requires radiography of the pelvis, including frog-leg lateral views. The head of the femur will appear like a "melting ice cream cone." This means blurring of the junction between the metaphysis and the growth plate.

- **Best therapy:** Surgical pinning with open or closed reduction is the most appropriate therapy for a patient with SCFE.

A 16-year-old male soccer player presents with swelling and pain over his right knee. He says he feels like his right knee is bigger than his left knee. Examination shows tenderness to palpation over the right tubercle with no pain on the left.

- **What is the most likely diagnosis?**

- **What is the next best step in management?**

- **Most likely diagnosis:** Osgood-Schlatter disease (OSD) is the most likely diagnosis in a patient with a stable knee that has pain over the tibial tubercle. The cause of OSD is repeated knee extension leading to microavulsions of the tibial tubercle.

- **Next best step:** Physical therapy, rest, and knee immobilization will improve symptoms. Patients normally have complete relief of symptoms in 12-24 months.

A 2-year-old boy is brought into the emergency department for pain in his right arm and is holding it close to him. The parents have been seen by child protective services because of the large number of posttraumatic injuries. Their findings are conclusive that the children are in a safe home. On examination the child cannot hear you and does not pay attention. Deformity of the right arm is noted. This is his seventh ED visit. His eyes appear to have a blue tint.

- **What is the most likely diagnosis?**

- **What is the most accurate test?**

- **What is the best therapy?**

- **Most likely diagnosis:** Osteogenesis imperfecta (OI) when a young child presents with repeated fractures caused AQ7 by fragile bones, blue sclerae, and early deafness. OI is an autosomal dominant inherited disorder.

- **Most accurate test:** Obtain a skin biopsy for collagen synthesis analysis by culturing dermal fibroblasts.

- **Best therapy:** There is no cure for OI, and therapy is aimed at fracture management, increasing bone mass, and correction of deformities from fractures. Oral bisphosphonates do not work, and thus infusions such as pamidronate are indicated.

A 12-year-old girl has pain in her leg, fevers, and weight loss over the past 6 months. His mother denies any recent trauma or accidents. He has had night sweats for the past 1 week. An x-ray of the leg is done, and it shows an onion-skin pattern.

- **What is the most likely diagnosis?**
- **What is the most accurate test?**
- **What is the best therapy?**

- **Most likely diagnosis:** Ewing sarcoma is the most common cause of localized bone pain in a young child without history of trauma in the setting of fevers night sweats and weight loss. The onion-skin pattern on x-ray is due to lytic lesions causing laminar periosteal elevation.

- **Most accurate test:** The most accurate test for Ewing sarcoma is analysis for a translocation t(11;22) via bone biopsy.

- **Best therapy:** Multidrug chemotherapy as well as local disease control with surgery and radiation.

An 11-year-old girl has pain in her leg, fevers, and weight loss over the past 6 months. An x-ray of the leg is done, and it shows a sunburst pattern.

- **What is the most likely diagnosis?**
- **What is the best therapy?**

- **Most likely diagnosis:** Osteogenic sarcoma, which occurs more commonly in the second decade of life, is characterized by sclerotic destruction causing a "sunburst" appearance. Therapy includes chemotherapy and ablative surgery.

- **Best therapy:** Combination of chemotherapy and surgery is the best therapy for someone with osteogenic sarcoma.

An 18-year-old woman presents with pain in her left leg, for the past 1 month. She thought it was an injury to do her recently joining the rowing team in college. The pain has gotten worse. Physical examination is unrevealing, but an x-ray shows a small round central lucency with a sclerotic margin.

- **What is the most likely diagnosis?**
- **What is the best therapy?**

- **Most likely diagnosis:** Osteoid osteoma is characterized by a painful lesion in the second decade of life more commonly seen in med with radiographs that reveal a small round central lucency with a sclerotic margin.

- **Best therapy:** The treatment is NSAIDs. The condition will eventually resolve spontaneously.

A 5-year-old boy is brought in by his parents because of a concern of how he is unable to run properly. They state he is a picky eater and eats only candy and soda. On examination the child has a waddling gait due to tibial and femoral bowing.

- **What is the most likely diagnosis?**
- **What is the best test?**
- **What is the best therapy?**

- **Most likely diagnosis:** Rickets, which is due to lack of vitamin D, calcium, or phosphate. This is likely due to a child's lack of vitamin D in his diet.

- **Best test:** An x-ray of the costochondral joints will show a rachitic rosary-like appearance with cupping and fraying of the epiphyses.

- **Best treatment:** Replacement of calcium, phosphate, and vitamin D in the form 1,25 (0H)2 ergocalciferol.

A 17-year-old star athlete in high school presents with right lower extremity pain. She is a runner who is also a part of the schools marching team, and loves to jump on her trampoline as well. An x-ray of the lower tibia and fibula is negative.

- **What is the most likely diagnosis?**
- **What is the next best step?**
- **What is the best therapy?**

- **Most likely diagnosis:** Stress fractures that are almost always secondary to overtraining. Patients present with pain on ambulation and, in particular, exertion. Erythema, swelling, and pain on palpation are all rare. Arthritis and chronic pain may occur if the stress fractures are not treated appropriately.

- **Next best step:** Order x-rays though these are usually negative. No laboratory tests are needed as stress fractures are mechanical problems and do not cause laboratory abnormalities.

- **Best therapy:** Rest and NSAIDs.

A 17-year-old boy with recent history of urethritis treated with Cipro for 3 days presents after falling during an ice hockey game. He was hit by an opposing player and felt force upon his ankle. He says he cannot bear weight on his right leg and cannot move his foot up and down. On squeezing the calf, there is no plantar flexion.

- **What is the most likely diagnosis?**
- **What is the best initial test?**
- **What is the most accurate test**
- **What is the best therapy?**

- **Most likely diagnosis:** Achilles tendon ruptures result from forced dorsiflexion of the ankle, from direct trauma to the tendon. Fluoroquinolones predispose patients to tendon ruptures.

- **Best initial test:** Clinical history and physical examination. The Thompson test is diagnostic for a complete tear of the Achilles tendon. Under normal circumstances when the tendon is intact and the calf is squeezed, the ankle will plantar-flex.

- **Most accurate test:** MRI.

- **Best therapy:** Surgical reattachment is the best option for complete tears.

# GASTRO

A child is brought for her first well-baby examination. The mother states when the child is alone or feeding, she notices the baby is blue. On stimulation, the baby cries and then suddenly becomes pink. There is considerable difficulty when trying to pass a nasogastric tube.

- **What is the most likely diagnosis?**
- **What is the best initial test?**
- **What is the most accurate test?**
- **What is the best therapy?**

- **Most likely diagnosis:** Choanal atresia is caused by failure in apoptosis, which leads to a membranous septum to remain between the nose and pharynx. This results in the child being unable to breathe through the nose and having subsequent cyanosis after trying to drink or eat.

- **Best initial test:** This test attempts to pass an NGT 3-4 cm into the nasopharynx, but it is unsuccessful.

- **Most accurate test:** Obtain a CT scan of the head and neck.

- **Best therapy:** Surgical repair is the correct answer for a patient who has choanal atresia.

A 2-day-old premature newborn is noted by his mother to choke when he tries to suckle and then develops frothing, bubbling, and coughing with respiratory distress accompanied by cyanosis. On examination the child has a holosystolic murmur and anal atresia.

- **What is the most likely diagnosis?**
- **What is the best initial test?**
- **What is the best therapy?**

- **Most likely diagnosis:** Esophageal atresia is an abnormal connection or ending to the trachea and esophagus. The most common anatomic variant of this malformation is the upper esophagus, which ends in a blind pouch and has a TEF. It is associated with VACTERL malformations.
- **Best initial test:** The inability to pass an NGT is the best initial test.
- **Best therapy:** Surgical ligation of the TEF with end-to-end anastomosis of the blind pouch esophagus to the stomach would be done.

## MASTER TIP

**VACTERL** malformations

V: Vertebral anomalies
A: Anal atresia
C: Cardiovascular anomalies
TE: Tracheoesophageal fistula
R: Renal (kidney) or radial anomalies (or both)
L: Limb defects

A 4-week-old newborn presents with severe projectile vomiting after each meal that the mother describes as nonbilious in nature. This is happening with each feeding and the mother is very concerned. On examination a small, firm, movable, olive-shaped mass is palpated in the mid-epigastrium. The mass is movable, and while the child is lying flat, a peristaltic wave can be seen.

- **What is the most likely diagnosis?**
- **What is the metabolic profile going to show?**
- **What is the most accurate test?**
- **What is the best therapy?**

- **Most likely diagnosis:** Pyloric stenosis is characterized by nonbilious, projectile vomiting after attempting to feed. The vomit lacks bile because of the inability of bile to reflux from the duodenum into the stomach. The child will still be hungry and have a desire to feed more.

- **Metabolic profile will show:** Because of the loss of hydrochloric acid, the child will have a hypochloremic, hypokalemic, metabolic alkalosis.

- **Most accurate test:** Ultrasonography is the best diagnostic test and will show a target sign. An upper GI series is less accurate than ultrasonography.

- **Best therapy:** Surgical intervention is the most appropriate therapy for a patient with pyloric stenosis.

A 1-day-old premature newborn is presented with green bilious vomiting after each meal. The mother has attempted to feed him, but the patient vomits every time. A plain film x-ray done at the outpatient clinic showed 2 gas bubbles with no distal bowel gas. Examination of the abdomen is performed.

- **What is the most likely diagnosis?**
- **What is the best therapy?**

- **Most likely diagnosis:** Duodenal atresia presents with bilious vomiting without abdominal distension because the obstruction is just distal to the ampulla of Vater. Abdominal radiograph shows the "double-bubble" sign in a newborn infant with duodenal atresia.

- **Best therapy:** The mainstay of therapy is surgical duodenoduodenostomy, but before surgery, it is important to place an NGT, give the child IV fluids, and replace electrolytes. The commonly seen electrolyte abnormality is hypokalemia, and the acid–base imbalance seen is a metabolic alkalosis.

A newborn failed to pass meconium and is now vomiting. Radiography completed 1 hour earlier shows a ground-glass or soap-bubble appearance.

- **What is the most likely diagnosis?**
- **What is the best therapy?**

- **Most likely diagnosis:** Meconium ileus. This is from the terminal ileum becoming obstructed by the thick meconium and is seen with neonates with cystic fibrosis.

- **Best therapy:** Make the child NPO, replace vascular volume, provide electrolytes with IV fluids, and decompress the bowel proximal to the terminal ileum. The most definitive therapy to give the child is an enema with hypertonic water-soluble contrast, which will draw fluid into the bowel and cause the meconium to wash out.

A newborn has not pooped since his birth. His diapers have been clean except for urine. On examination there is severe abdominal distension, and upon rectal examination by the intern, a large release of stool and gas explodes onto the examiners face.

- **What is the most likely diagnosis?**
- **What is the best initial therapy?**
- **What is the most accurate test?**
- **What is the best therapy?**

- **Most likely diagnosis:** Hirschsprung disease is the congenital absence of the ganglionic cells in the submucosal and myenteric plexus. This leads to excessive smooth muscle tone at the rectum, leading to uncoordinated peristalsis and contractility. The most common cause of intestinal obstruction in a neonate is Hirschsprung disease.

- **Best initial test:** A barium enema, which will help demonstrate a narrow distal colon with proximal dilation. Radiography of the abdomen will show distended bowel loops but is very nonspecific.

- **Most accurate test:** The most accurate test is a suction rectal biopsy.

- **Best therapy:** Treatment of patients with Hirschsprung disease consists of laparoscopic removal of the abnormal section of the colon followed by reanastomosis.

A 2-year-old boy is presented with 2 weeks of blood in his diaper that is noted in his stool. The baby does not cry when he passes stool. The mother describes his stools as bright red. The stool is soft, nontender abdomen with a palpable mass in the mid-abdomen.

- **What is the most likely diagnosis?**
- **What is the most accurate test?**
- **What is the best therapy?**

- **Most likely diagnosis:** Meckel diverticulum is the most common cause of painless bleeding in an infant. It is caused by gastric acid–secreting mucosa that is ectopic to the intestine that causes bleeding by searing the mucosa of the small bowel. Meckel diverticulum is the most common congenital abnormality of the small intestine.

- **Most accurate test:** A technetium-99m scintiscan, also known as a Meckel scan.

- **Best therapy:** Surgical excision of the diverticulum is the most appropriate therapy for a patient who presents with symptomatic ectopic gastric tissue.

## MASTER TIP

**Rule of 2s for Meckel diverticulum**

- 2% of population
- 2% symptomatic
- 2 in long
- 2 ft from ileocecal valve
- 2 types of tissue

An 18-month-old boy is seen for abdominal pain. He has had currant jelly in his diaper for the last 3 bowel movements. The mother is unaware of who keeps feeding her child currant jelly sandwiches. On examination the child appears to be in pain and brings his knees up to his chest. Sausage-shaped mass and emptiness in the right lower quadrant are present on abdominal examination.

- **What is the most likely diagnosis?**
- **What is the most accurate test?**
- **What is the best therapy?**

- **Most likely diagnosis:** Intussusception occurs when the bowel telescopes into itself, leading to colicky pain with the legs flexed at peak pain, bloody stools that appear like currant jelly, and vomiting. Patients may also have fevers, lethargy, and a sausage-shaped mass in the right lower colon.

- **Most accurate test:** Ultrasonography; the most associated finding is a "doughnut sign."

- **Best therapy:** An air enema is the most accurate study of choice as well because it is both diagnostic and therapeutic in nature. If the patient has peritoneal signs or perforation (free air) or presents with shock, surgery is the best therapy and air enema will not help.

A 17-year-old boy presents with bloody diarrhea and abdominal pain of 2 weeks in origin and severe fatigue. He says he has not had a formed stool in a month, and for the last 2 weeks his bowel movements have been almost entirely bloody or blood mixed with stool. He has never had this happen before and has no past medical history. His older brother has some colon condition that his parents sent him to India to get treatment. The patient on examination is febrile and tender to palpation over the left lower quadrant. He has painful lesions on the extensor surfaces of the lower extremities. Rectal examination shows frank blood on the glove.

- **What is the most likely diagnosis?**
- **What is the most accurate diagnostic test?**
- **What is the most appropriate therapy?**
- **What is the best counseling for this patient?**

- **Most likely diagnosis:** Inflammatory bowel disease (IBD), most specifically ulcerative colitis. Ulcerative colitis is continuous from the rectum upward, with the rectum almost universally being involved. There is rarely perianal disease and the ulcerations are limited to the mucosa. Common presenting symptoms include bloody diarrhea, abdominal pain, and fever with possible findings of erythema nodosum.

- **Most accurate diagnostic test:** A colonoscopy with biopsy showing chronic inflammation with crypt architecture deformity.

- **Most appropriate therapy:** High-dose corticosteroids to induce remission ulcerative colitis, followed by steroid-sparing medications such as immunomodulators (6MP or azathioprine) or biologic therapy (TNF-α inhibitors or integrin inhibitors).

- **Best counseling:** Colonoscopy to screen for malignancy should be performed 8 years after the patient is diagnosed with IBD.

A 15-year-old boy presents after noticing stool staining his underwear. He states at first he thought perhaps it was due to poor bathroom hygiene; however, it has become more frequent and recently he has begun having abdominal pain described as cramping pain exacerbated by passing flatus. The patient was diagnosed recently with oral ulcers, and his primary care physician said it was due to folate deficiency.

- **What is the most likely diagnosis?**
- **What is the most accurate diagnostic test?**
- **What is the most appropriate therapy?**
- **What is the best counseling for this patient?**

- **Most likely diagnosis:** IBD, most specifically Crohn disease. Crohn disease can affect any part of the GI tract from the mouth to the anus but commonly is seen at the terminal ileum and spares the rectum. Patients can present with symptoms of small bowel obstruction from severe inflammation or perianal disease such as fistulas or abscesses.

- **Most accurate diagnostic test:** Colonoscopy with terminal ileum biopsy showing transmural inflammation and granulomas.

- **Most appropriate therapy:** High-dose corticosteroids to induce remission ulcerative colitis, followed by steroid-sparing medications such as immunomodulators (6MP or azathioprine) or biologic therapy (TNF-α inhibitors or α4β7 integrin inhibitors).

- **Best counseling:** Colonoscopy to screen for malignancy should be performed 8 years after the patient is diagnosed with IBD.

A 17-year-old girl with ulcerative colitis is referred to her gastroenterologist for an abnormal liver function tests. The patient has noted pruritus recently and slight yellowing of her eyes. Physical examination shows excoriations of the arms and chest and icterus of the eyes.

- **What is the most likely diagnosis?**
- **What is the most accurate diagnostic test?**
- **What is the best initial therapy?**
- **What is the most definitive therapy?**

- **Most likely diagnosis:** Primary sclerosing cholangitis that is an autoimmune condition characterized by destruction of the bile ducts inside and outside of the liver eventually leading to cirrhosis.
- **Most accurate diagnostic test:** Visualization of the bile duct with MRI.
- **Best initial therapy:** Ursodeoxycholic acid that helps reduce the cholestasis and improves blood test results. Symptoms of pruritus are relieved with cholestyramine.
- **Most definitive therapy:** Liver transplant.

A 3-year-old girl presents with abdominal pain that her mother characterizes as “coming and going.” She states that today was her fifth bout of pain. On examination the child looks ill, is febrile, and has abdominal distension and vomits in your office. An upper GI series shows a “bird’s beak” appearance.

- **What is the most likely diagnosis?**
- **What is the most definitive therapy?**

- **Most likely diagnosis:** A volvulus is a subtype of malrotation, in which a loop of bowel is twisted about a focal point along the mesentery attached to the intestinal tract, which may result in a bowel obstruction.

- **Most definitive therapy:** Surgical or endoscopic untwisting is emergently needed. The most common site in the midgut is at the ileum in children.

A 6-year-old boy is brought to the office for a rash on his lower extremities and buttocks, abdominal pain, and joint pain. The pain in his joints has been mostly localized to his knees and ankles. On examination a maculopapular blanching rash is seen below the waist; in certain areas, petechiae and purpura are seen.

- **What is the most likely diagnosis?**
- **What is the best diagnostic test?**
- **What is the most definitive therapy?**

- **Most likely diagnosis:** Henoch-Schönlein purpura (HSP) presents at the triad of abdominal pain, arthralgias, and purpura. HSP is an IgA-mediated vasculitis of the small vessel. It is caused by complexes of IgA and complement component 3 (C3) being deposited into arterioles, capillaries, and venules.

- **Best diagnostic test:** The best diagnosis test is made through clinical diagnosis; a definitive diagnosis is made through skin biopsy of one of these purpuric lesions.

- **Most definitive therapy:** Symptomatic treatment is the best therapy because this patient's disease is self-limited.

A 1-day-old preterm female neonate is noted to have increased abdominal distension. On rectal examination the stool is positive. X-ray of the abdomen shows air in the bowel wall, but no free air is noted.

- **What is the most likely diagnosis?**
- **What is the best therapy?**

- **Most likely diagnosis:** Necrotizing enterocolitis is condition of premature infants where the bowel undergoes necrosis and bacteria invade the intestinal wall. Risk factors are children who are severely premature with low birth weight.

- **Best therapy:** Make the child NPO, IV fluids, and nasogastric tube (NGT) for bowel decompression. If medical management does not improve symptoms, surgical resection of effected bowel is indicated.

# CARDIOLOGY

A newborn is found to have difficulty with feeding. Her mother had rubella during pregnancy. On examination PDA is normal $S_1$, with an obscured $S_2$ with machinery murmur.

- **What is the most likely diagnosis?**
- **What is the most accurate test?**
- **What is the best therapy?**

- **Most likely diagnosis:** PDA presents with a normal $S_1$ and an obscured $S_2$ with a machinery murmur. It is caused by the continued communication between the thoracic aorta and pulmonary artery, likely secondary to this patient's maternal rubella infection.

- **Most accurate test:** Echocardiography is the best diagnostic test in a patient with PDA. Echocardiography with Doppler imaging will show patent flow through the ductus arteriosus.

- **Best therapy:** Most PDAs close spontaneously, and it is acceptable to observe the patient while she is asymptomatic and reevaluated in 6-12 months.

An 18-year-old basketball player presents with shortness of breath that has recently been hindering his ability to play. The patient had some mild chest pain and light-headedness but denies ever-losing consciousness. He wants to know when he can go back to playing for his school team.

- **What is the most likely diagnosis?**
- **What is the most common symptom?**
- **What is the best initial test?**
- **What is the best initial therapy?**
- **What worsens their symptoms?**
- **What medications are contraindicated?**
- **What is the most appropriate preventive step?**
- **What is the most appropriate therapy?**

- **Most likely diagnosis:** Hypertrophic obstructive cardiomyopathy (HOCM).
- **Most common symptom:** Dyspnea. Sudden cardiac death is the most common wrong answer during rounds as the answer to the most common presenting complaint.
- **Best initial test:** Echocardiogram looking for an intracardiac septum that is 1.5 times the thickness of the posterior wall.
- **Best initial therapy:** β-Blockers.
- **Symptoms are worsened:** Anything that will increase the heart rate or decrease the left ventricular lumen size.
- **Contraindicated medication:** Diuretics are contraindicated in HOCM as they will dehydrate the patient and cause the left ventricular chamber to become smaller and increase the obstruction.
- **Most appropriate preventive step:** Place an implantable cardiac defibrillator.
- **Most appropriate therapy:** If β-blockers do not work, consider alcohol ablation of the septum. If symptoms persist, surgical myomectomy is the most definitive therapy.

## MASTER TIP

Squatting and handgrip decrease the murmur of HOCM. Standing, Valsalva maneuver, and amyl nitrate increase the intensity or loudness of the murmur.

A 17-year-old girl presents with substernal chest pain. She had upper respiratory infection 2 weeks ago. She says the pain is constant, and it only improves when she is leaning forward. On examination a friction rub is heard and the lungs are clear.

- **What is the most likely diagnosis?**
- **What is the most common cause?**
- **What is seen on chest x-ray?**
- **What is the best initial test?**
- **What is the most specific finding?**
- **What is the best diagnostic test?**
- **What is the best initial therapy?**

- **Most likely diagnosis:** Acute pericarditis, which is an inflammation of the pericardium. Patients often present with sharp chest pain that changes with body position; the pain is worsened by lying flat and improved by sitting upright. Acute pericarditis is when symptoms occur for only a few days. Chronic pericarditis is when symptoms last for months.
- **Most common cause:** Viral infection, most specifically Coxsackie B virus followed by CMV and HSV.
- **Seen on chest x-ray:** Neither specific nor accurate. X-ray abnormalities occur with pericardial effusion or constrictive pericarditis, not acute pericarditis.
- **Best initial test:** ECG shows ST-segment elevation in all leads and PR-segment depression.
- **Most specific finding:** PR-segment depression.
- **Best diagnostic test:** ECG is most accurate for pericarditis. Echocardiogram diagnoses pericardial tamponade.
- **Best initial therapy:** Treat inflammation with NSAIDs and colchicine.

A 16-year-old boy presents with sharp left- and right-sided chest pain that has slowly been getting worse over the last few days. On examination, there is point tenderness of the rib cage and the pain becomes worse with more forceful palpation.

- **What is the most likely diagnosis?**
- **What is the best test?**
- **What is the best therapy?**

- **Most likely diagnosis:** Costochondritis. This is an inflammatory state of insertion points of the ribs, and it commonly affects third, fourth, and fifth costosternal joints.

- **Best test:** History and physical examination.

- **Best therapy:** Treatment with NSAIDs. If this fails, oral or injected steroids are next in line.

A 16-year-old girl experiences chest pain and shortness of breath after hearing that her prom date has stood her up. ECG shows ST elevation in the leads of the heart corresponding to the anterior wall accompanied by T-wave inversions and prolongation of the QT interval.

- **What is the most likely diagnosis?**
- **What is the best initial test?**
- **What is the best initial therapy?**
- **What is the most preventive measure?**

- **Most likely diagnosis:** Takotsubo cardiomyopathy is a nonischemic cardiomyopathy. This temporarily weakens the muscle of the heart and is precipitated by emotional stress. Patients can present with symptoms of CHF. Why sudden, intense emotional stress damages the heart is not known.

- **Best initial test:** Echocardiogram will demonstrate a hyperkinetic left ventricular base, but the remainder of the ventricle will be dyskinetic. The ventricle is bulging out at the apex with preserved function of the base.

- **Best initial therapy:** β-Blockers. You treat as CHF or MI until ischemic heart disease is excluded. Left ventricular function will normalize in about 2 months.

- **Most important preventive step:** Provide counseling to the patient to reduce stress and cope with emotional circumstances.

A 24-month-old girl presents for feeding and has episodes of turning blue and gasping for breath. The mother has noticed the child feels better when she squats.

- **What is the most likely diagnosis?**
- **What is the best initial test?**
- **What is the best therapy?**

- **Most likely diagnosis:** Tetralogy of Fallot is a congenital heart defect characterized by on overriding aorta, pulmonary stenosis, VSD, and right ventricular hypertrophy. The baby is cyanotic, and when she develops breathlessness, she will squat down to achieve increased oxygenation. The squatting causes increased peripheral vascular resistance and allows for a temporary reversal of the shunt.

- **Best initial test:** Radiography of the chest shows a boot-like appearance of the heart with tetralogy of Fallot.

- **Best therapy:** Surgical repair is the definitive therapy and is designed to reduce the right outflow obstruction.

A cyanotic child is brought in by her mother and states that the child has been lifeless and not eating. The mother has bipolar disorder and continued her lithium throughout pregnancy.

- **What is the most likely diagnosis?**
- **What is the best initial test?**
- **What is the best test?**
- **What is the best therapy?**

- **Most likely diagnosis:** Ebstein anatomy is the development of a downward displaced tricuspid valve into the right ventricle secondary to lithium exposure to the fetus by the mother.
- **Best initial test:** Obtain an echocardiogram.
- **Best test:** Echocardiography is the most accurate test for many congenital cardiac lesions.
- **Best therapy:** RFA followed by surgery is done if the patient presents with WPW or supraventricular tachycardia.

A 1-day-old male newborn is cyanotic and short of breath. A holosystolic murmur occurs at the lower sternal border with a single loud $S_2$.

- **What is the most likely diagnosis?**
- **What is the best initial test?**
- **What is the best therapy?**

- **Most likely diagnosis:** Transposition of the great arteries is a cyanotic condition in which the aorta arises from the right ventricle. The exact causes and etiology of the condition are unknown, but it presents with cyanosis unless there are a patent PDA and foramen ovale.

- **Best initial test:** Echocardiography is the next best step in the diagnosis of transposition of the great arteries.

- **Best therapy:** Medical therapy with infusion of PGE1 to maintain the opening of the PDA to allow for blood to flow into the systemic circulation while the child is prepared to have an arterial switch therapy.

A 2-week-old newborn is cyanotic. Chest radiography shows cardiomegaly, an ECG reveals large QRS complexes, and an echocardiogram shows a single outflow from the ventricles.

- **What is the most likely diagnosis?**
- **What is the best initial test?**
- **What is the best therapy?**

- **Most likely diagnosis:** Truncus arteriosus is the most likely condition when an infant presents with worsening cyanosis and findings of CHF. The condition is caused by a single arterial trunk arising from the ventricles by means of a single semilunar valve.

- **Best initial test:** Echocardiography is the next best step in the diagnosis of transposition of the great arteries.

- **Best therapy:** Medical therapy with infusion of PGE1 to maintain the opening of the PDA to allow for blood to flow into the systemic circulation while the child is prepared to have an arterial switch therapy.

A 9-year-old boy presents with severe joint pain involving his knees, ankles, and wrists. He also complains of chest pain and shortness of breath, and his mother noticed a nonpruritic erythematous rash on his trunk, which has been enlarging. The child had a recent sore throat 4 weeks ago but did not receive any antibiotics. On examination the child appears to be having uncoordinated, rapid, jerking movements of the face, hands, and feet with a macular erythematous rash on the trunk.

- **What is the most likely diagnosis?**
- **What is the most common causative agent?**
- **What is the best therapy?**

- **Most likely diagnosis:** Rheumatic fever is an inflammatory condition in which antibodies against *Streptococcus* cross-react with the heart and joints, producing symptoms such as carditis, polyarthritis, subcutaneous nodules, erythema marginatum, and Sydenham chorea.

- **Most common causative agent:** Group A β-hemolytic streptococcal infection.

- **Best therapy:** Penicillin for 10 days is the next best step in the management of this patient.

A 19-year-old man presents with fever and malaise of 2 days duration. He has a history of IV drug use and says he has been using drugs for the last 2 months since his father passed away. On examination he is febrile and appears toxic. He has a grade 3/6 holosystolic murmur that increases with inspiration.

- **What is the most likely diagnosis?**
- **What is the most likely causative organism?**
- **What enzyme from the organism allows to cause this disease?**
- **What is the best initial test?**
- **What is the most accurate test?**
- **What is the best therapy?**

- **Most likely diagnosis:** Endocarditis. Endocarditis is an infection of the heart valves leading to a murmur and fever. In this patient the most likely valve affected is the tricuspid valve.
- **Most likely causative organism:** *Staphylococcus aureus* where there is an IDUA. *Streptococcus viridans* is the most common organism to cause endocarditis after dental procedures.
- **Enzyme allowing to cause this disease:** Coagulase is the enzyme, which allows *Staphylococcus aureus* to literally melt through heart valves. The most common valve affected in IDUs is the tricuspid valve.
- **Best initial test:** Blood cultures.
- **Most accurate test:** Echocardiogram of the heart. A TTE is 60% sensitive. If the TTE is negative and you have a positive blood culture, the next best step is to obtain a TEE.
- **Most appropriate therapy:** The most appropriate therapy depends on the underlying organism that is found. Methicillin-sensitive *S. aureus* is treated with oxacillin, nafcillin, or cefazolin, whereas methicillin-resistant *S. aureus* is treated with vancomycin. Viridans streptococci are treated with ceftriaxone. *Enterococcus* is treated with ampicillin and gentamicin.

## MASTER TIP

The most common cause of culture-negative endocarditis is Coxiella or Bartonella.

A 16-year-old girl presents with increasing shortness of breath and increasing severity. She has markedly decreased exercise tolerance and can no longer participate in high school sports. Physical examination demonstrates a holosystolic murmur that radiates to the axilla.

- **What is the most likely diagnosis?**
- **What is the best initial test?**
- **What is the most accurate test?**
- **What is the best initial therapy?**
- **What is the most definitive therapy?**
- **What will Valsalva maneuver, leg raising, and handgrip do to the murmur?**

- **Most likely diagnosis:** Mitral regurgitation (MR) that presents similarly to CHF with dyspnea and edema. However, MR gives a pansystolic murmur that radiates to the axilla will be noted. The patient may have a history of MR associated with hypertension or/and endocarditis that leads to valve damage.

- **Best initial test:** Echocardiogram.

- **Most accurate test:** Cardiac catheterization.

- **Best initial therapy:** Vasodilators such as is with ACE inhibitors or ARBs or nifedipine.

- **Most definitive therapy:** ACE inhibitorsdecrease the progression rate of regurgitation, valve replacement or repair is the most definitive therapy. Even when asymptomatic, these valve repair or replacementare performed when the left ventricular end-systolic diameter is >40 mm or the ejection fraction is <60%.

- **Effect of Valsalva maneuver, leg raising, and handgrip on the murmur:** Squatting and leg raising will increase the murmur whereas standing will decrease the murmur.

# INFECTIOUS DISEASE

A 2-month-old infant is brought to the ED. The baby was in her usual state until she began crying, and at that time she was given some honey to calm her down. She became less playful and is now difficult to wake up. Examination shows hypotonia in all extremities and the child is only breathing at a rate of 4-6 breaths/min.

- **What is the most likely diagnosis?**
- **What is the next best step?**
- **What is the best therapy?**

- **Most likely diagnosis:** *Clostridium botulinum*. Botulinum poisoning presents in a child aged <1 year who presents with severe hypotonia and respiratory paralysis after exposure to honey.

- **Next best step:** The child is presenting with signs and symptoms of respiratory paralysis caused by botulinum toxin. The first step is to stabilize the child by intubating her and placing her on a ventilator.

- **Best Therapy:** An antitoxin (human botulinum immunoglobulin) and supportive care.

A 7-year-old girl presents with fevers. The child's mother noted that the child has had high fevers and swelling in the neck and underarm area. On examination there are scratches on the child's arms, which the mother states are from their new kitten.

- **What is the most likely diagnosis?**
- **What is the causative agent?**
- **What is the next best step?**

- **Most likely diagnosis:** The patient presents with cat scratch that commonly presents 1-2 weeks after a kitten scratches a child and presents with lymphadenopathy, joint pains, and high fevers.
- **Causative agent:** Cat scratch disease (CSD) is caused by *Bartonella henselae*.
- **Next best step:** Virtually all cases of CSD remit spontaneously without therapeutic intervention. Antibiotics such as azithromycin are recommended only for immunocompromised patients.

A 3-year-old daughter from South Asia is brought to the ED for a rash. The mother says the child never had any vaccines. On examination the child's eyes are injected; generalized, maculopapular, erythematous rash is noted; and grayish dots are seen on the buccal mucosa.

- **What is the most likely diagnosis?**
- **What is the next best step?**

- **Most likely diagnosis:** Measles is a viral illness that occurs in young children who are unvaccinated against the disease. It classically presents with a rash that begins on the head and spreads down to the trunk. The prodrome of the illness includes a cough, coryza, conjunctivitis, and then Koplik spots (on the buccal mucosa).

- **Next best step:** The diagnosis and treatment of measles include observation and supportive treatment. There is no specific treatment for measles.

A 5-year-old child with an absentee mother and known noncompliance with immunizations presents to the office. The child has been feeling unwell. His rash began his face and spread to the rest of his body. The mother says the rash occurred at the same time her son felt warm. Rose spots are seen on the soft palate.

- **What is the most likely diagnosis?**
- **What is the next best step?**

- **Most likely diagnosis:** Rubella presents similar to measles in that a rash occurs, but it starts on the face and then spreads to the rest of the body. It occurs concurrently with a fever and has lymphadenopathy in the postoccipital, retroauricular, and occipital region.

- **Next best step:** There is no specific treatment for rubella except for observation and supportive care of symptoms.

An 8-month-old infant is brought to her pediatrician's office because of a rash. The father states the child had a fever 2 days ago. On examination the rash appears pink and is raised.

- **What is the most likely diagnosis?**
- **What is the etiologic agent?**
- **What is the next best step?**

- **Most likely diagnosis:** Roseola is a febrile illness and most commonly presents as a fever for 3 or 4 days followed by a rose-colored maculopapular rash. It is collectively referred to as sixth disease.

- **Etiologic agent:** Roseola is caused by the HHV-6 infection.

- **Next best step:** The diagnosis of roseola is based on clinical diagnosis; the treatment is supportive.

A 6-year-old boy is brought to the office by father for swelling of his face and testicles. He has never had vaccinations because he was raised in the wilderness by parents who only eat organic produce. Examination does not reveal a rash. His face has swelling over the cheeks and jaw, with nonerythematous inflammation of the testes.

- **What is the most likely diagnosis?**
- **What is the next best step?**

- **Most likely diagnosis:** Mumps is a viral infection caused by a paramyxovirus and presents with fevers, bilateral parotid gland enlargement, and possibly orchitis or pancreatitis. This is a viral syndrome without any rash.

- **Next best step:** The diagnosis of mumps is a clinical diagnosis, and the treatment is supportive.

## MASTER TIP

Meningoencephalomyelitis is the most common complication of having mumps.

A 5-year-old boy has redness across both cheeks. He also has a lacy rash across the upper extremities and trunk. The father thinks the boy was slapped by the teacher at school and wants to press charges. Examination reveals erythema of the cheeks, and a lacy lenticular rash on the upper arms, torso, and legs. The child says he has been red like a superhero for a few weeks now.

- **What is the most likely diagnosis?**
- **What is the next best step?**

- **Most likely diagnosis:** Erythema infectiosum is a viral exanthem secondary to a parvovirus B19 infection that can last for up to 40 days. The child will present with a very red "slapped cheek" look with a reticular rash on the extremities and sparing of the palms and soles.

- **Next best step:** The diagnosis of parvovirus B19 is a clinical diagnosis, and the disease is self-limiting. The treatment is supportive observation.

## MASTER TIP

Parvovirus B19 + Pregnant women = Hydrops fetalis

Parvovirus B19 + Sickle cell disease = Aplastic crisis

Parvovirus B19 + HIV/AIDS = Infection

A 5-year-old boy is noted by the school teacher to have a beefy and swollen tongue. The school nurse calls your office because he is febrile and says his tongue looks like a strawberry. She says his body feels course like sandpaper.

- **What is the most likely diagnosis?**
- **What is the next best step?**

- **Most likely diagnosis:** Scarlet fever is an infectious disease caused by *Streptococcus pyogenes* that presents with a sore throat, strawberry tongue, and sandpaper-like rash that blanches easily. The rashes in the inguinal areas and folds of the body are known as *Pastia lines*. The most common complications are acute rheumatic fever and glomerulonephritis.

- **Next best step:** Penicillin. The diagnosis of scarlet fever is made clinically through history and physical findings.

An 11-year-old child prodigy was taken to India 1 month ago by his parents for a pilgrimage, and upon returning to the states, his parents note he has fallen ill. He complains feeling chills, nausea, vomiting, decreased appetite, and abdominal pain in the right side of his body. The mother states he was very keen on eating street food like the other children the whole time he was in India. On examination there is splenomegaly and jaundice with icterus is present.

- **What is the most likely diagnosis?**
- **What is the next best step?**
- **What is the best therapy?**

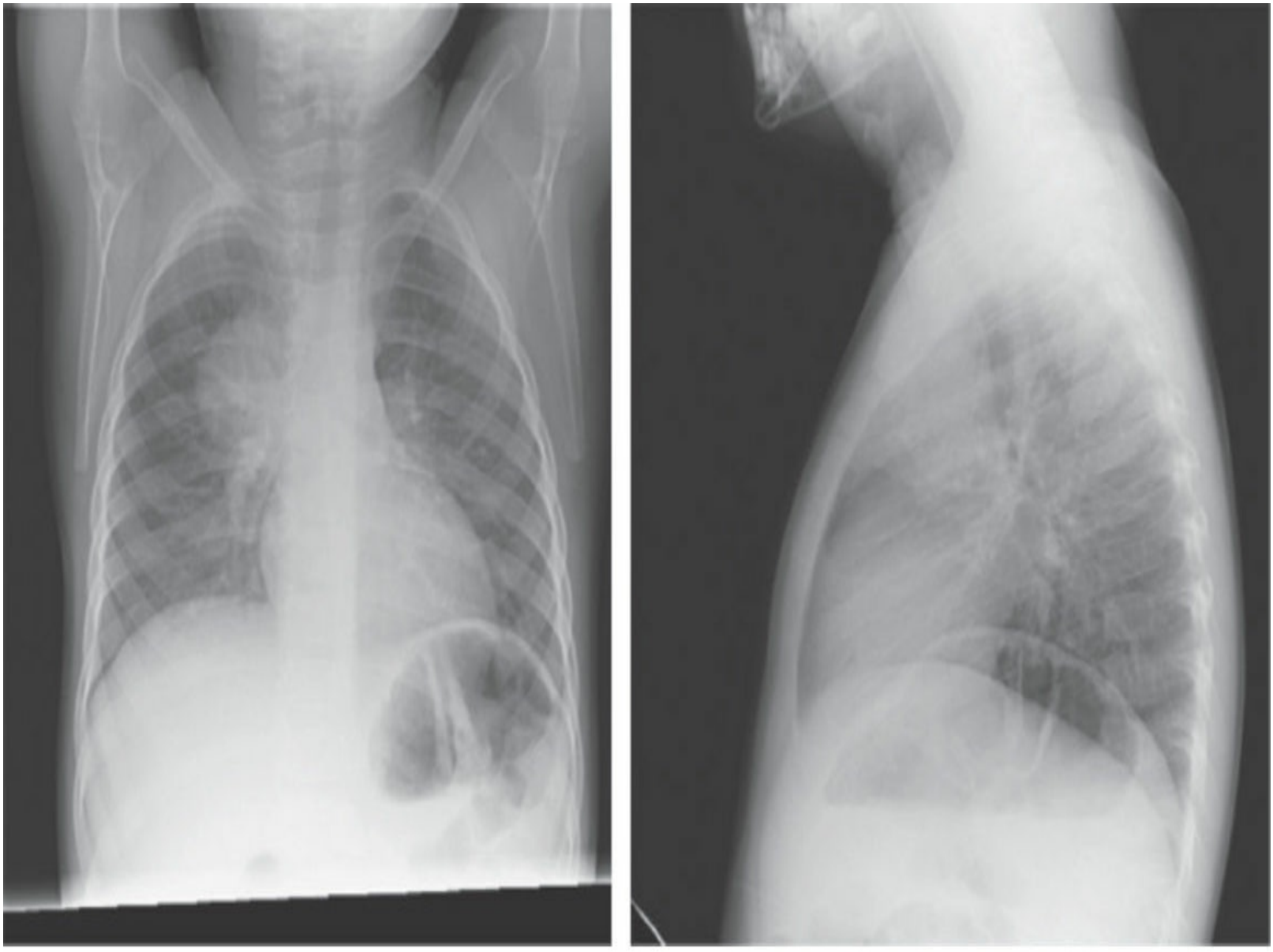
- **Most likely diagnosis:** Hepatitis A is a viral liver disease that can cause mild to severe illness. The hepatitis A virus (HAV) is transmitted through fecal-oral route or through direct contact with an infectious person. The incubation period for HAV is 15-50 days. HAV infection in children is typically an acute, self-limited illness associated with nonspecific symptoms, such as fever, abdominal pain or discomfort, and diarrhea. Jaundice usually occurs 1 week after onset of symptoms.

- **Next best step:** The diagnosis of acute HAV infection is made by the detection of anti-HAV IgM in the blood.

- **Best therapy:** Treatment is supportive. Hepatitis A infection in children is usually a minor and self-limited infection.

# RADIOLOGY

A 10-year-old neglected child is brought in with fever, productive cough, and malaise. A chest x-ray is seen (Figure 10-1).



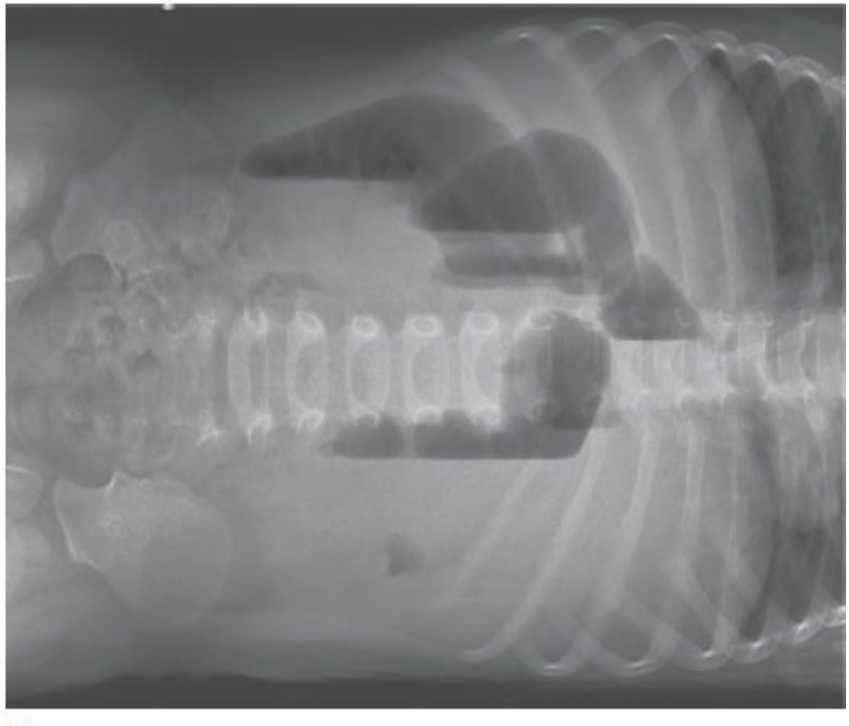
A B

- **What is the most likely diagnosis?**

- **Most likely diagnosis:** Pneumonia as demonstrated on chest x-ray. Treatment should include antibiotics, respiratory support as indicated with supplemental oxygen, and bronchodilator therapy.

A 7-year-old child with cystic fibrosis presents with nausea, vomiting, and inability to pass stool for 2 days. This is the third time this has happened to the child. An x-ray is obtained as seen in Figure 10-2.

A



B

- **What is the most likely diagnosis?**

- **Most likely diagnosis:** Small bowel obstruction in the setting of cystic fibrosis as demonstrated by dilated loops of small intestine in the upper portion of the abdomen. There are multiple air-fluid levels at varying heights on the lateral decubitus view.

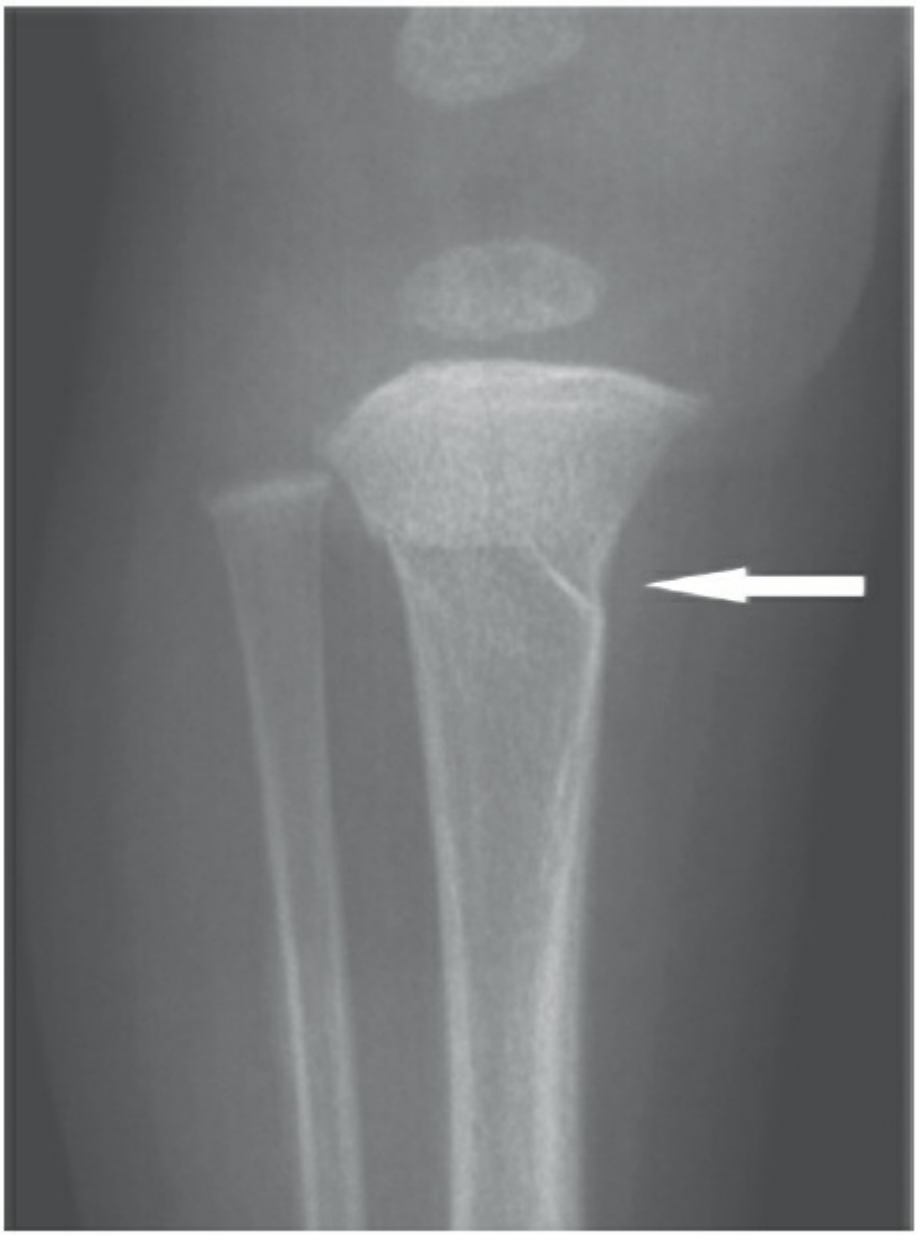
An 8-year-old girl is brought in after she fell of the bunk bed while playing with her sister. She is holding her arm close to her and refuses to look you in the eye. Her mother's boyfriend has brought her to ED, as the mother was working and unable to accompany the child. This is the patient's fifth visit to the ED. Previously, she was treated for multiple broken bones and retinal detachment as a child. An x-ray of the arm is obtained showing multiple breaks of varying healing and stages.

- **What is the most likely diagnosis?**

- **What is the next best step?**

- **Most likely diagnosis:** Child abuse. The medical diagnosis of physical abuse is based on the presence of a discrepant history, in which the history offered by the caregiver is not consistent with the clinical findings. This child is older but has numerous injuries of concern.
- **Next best step:** Admit the child and call child protective services.

An 11-year-old boy falls down while skateboarding and is brought to the ED because his wrist looks malformed. An x-ray is obtained as seen in Figure 10-3.



- **Most likely diagnosis?**
- **Next best step?**

- **Most likely diagnosis:** A fracture of the ulna. A greenstick fracture is a fracture in a young, soft bone in which the bone bends and breaks.

- **Next best step:** Immobilization and physical therapy. Removable splints result in better outcomes to casting in children with fractures of the distal radius.

A 15-year-old football player takes a direct blow to the front of his knees during a tackle and immediately feels significant pain over his knee. On examination drawer signs are negative, but a tender swollen prepatellar area is noted and the boy is unable to maintain the leg extended against gravity. An x-ray is seen (Figure 10-4).

- **What is the most likely diagnosis?**
- **What is the next best step?**
- **What is the best therapy?**

- **Most likely diagnosis:** A patellar fracture that occurs from direct trauma to the anterior knee. Patients present with a tender swollen prepatellar area and inability to maintain the leg extended against gravity.

- **Next best step:** Obtain x-rays of the patella including a sunrise view.

- **Best therapy:** Complete transverse fractures, especially if displaced, need surgical ORIF.

An 8-year-old boy jumps off his home staircase in attempt to fly like the man in the red cape. He lands on his feet per his mother and experiences significant pain. An x-ray is obtained in the ED as seen in Figure 10-5.

- **What is the most likely diagnosis?**
- **What is the next best step?**
- **What is the best therapy?**

- **Most likely diagnosis:** A calcaneal fracture that is caused by compression, usually resulting from a fall from a height.
- **Next best step:** Obtain standard x-rays of the foot with the addition of a calcaneal view and a CT scan for displaced fractures.
- **Best therapy:** Rest, immobilization in a compression bandage, and avoiding weight bearing are the best therapies. Casting and fixation if the fracture is displaced.